



# BAT54S

## Schottky barrier diodes

1 July 2022

Product data sheet

## 1. General description

Planar Schottky barrier diodes with an integrated guard ring for stress protection, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Low forward voltage
- Low capacitance

## 3. Applications

- Ultra high-speed switching
- Line termination
- Voltage clamping
- Reverse polarity protection

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage		-	-	30	V
$V_F$	forward voltage	$I_F = 100 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25 \text{ } ^\circ\text{C}$	-	-	800	mV
$I_R$	reverse current	$V_R = 25 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25 \text{ } ^\circ\text{C}$	-	-	2	$\mu\text{A}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode (diode 1)	<p>SOT23</p>	<p>006aaa437</p>
2	K2	cathode (diode 2)		
3	K1; A2	cathode 1; anode 2		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAT54S	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAT54S	%V4

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_R$	reverse voltage			-	30	V
$I_F$	forward current	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	200	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ s}$ ; $\delta \leq 0.5$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	300	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p < 10\text{ ms}$ ; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$		-	600	mA
Per device; one diode loaded						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[1]	-	250	mW
$T_j$	junction temperature			-	150	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature			-55	150	$^{\circ}\text{C}$
$T_{stg}$	storage temperature			-65	150	$^{\circ}\text{C}$

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	500	K/W

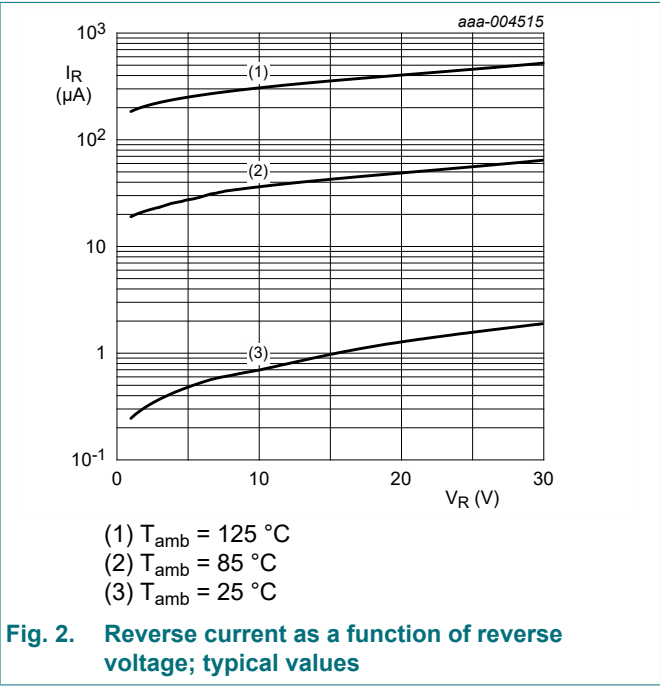
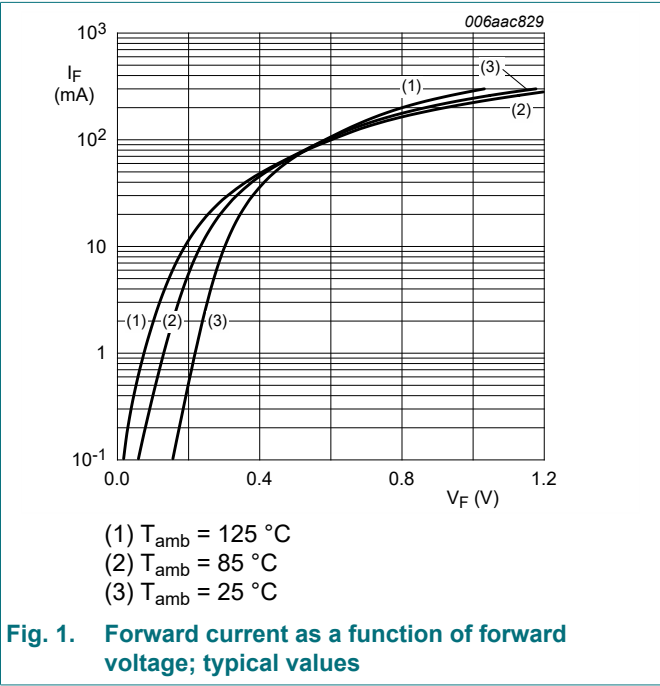
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses PR are a significant part of the total power losses.

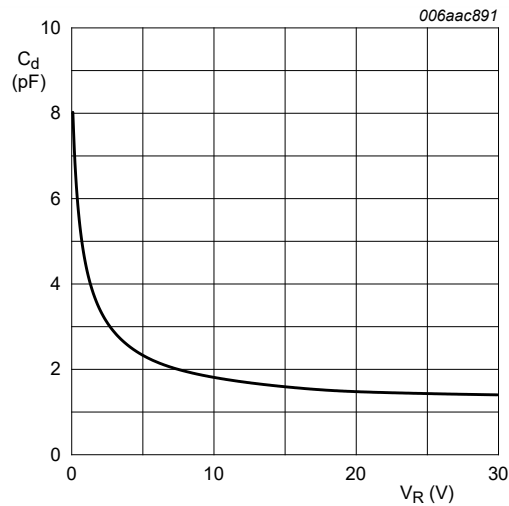
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 0.1\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	240	mV
		$I_F = 1\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	320	mV
		$I_F = 10\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	400	mV
		$I_F = 30\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	500	mV
		$I_F = 100\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	800	mV
$I_R$	reverse current	$V_R = 25\text{ V}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	2	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	10	pF
$t_{rr}$	reverse recovery time	$I_F = 10\text{ mA}$ ; $I_R = 10\text{ mA}$ ; $I_{R(\text{meas})} = 1\text{ mA}$ ; $R_L = 100\text{ }\Omega$ ; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$	-	-	5	ns

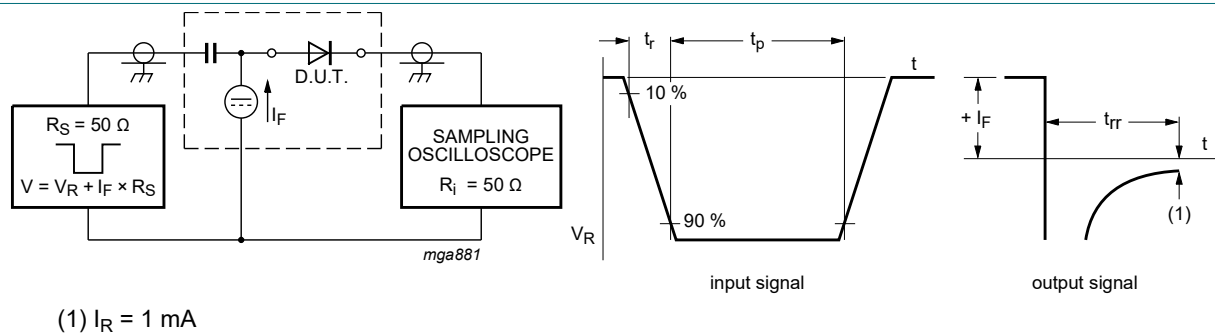




$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

11. Test information



(1)  $I_R = 1\text{ mA}$

Fig. 4. Reverse recovery time test circuit and waveforms

12. Package outline

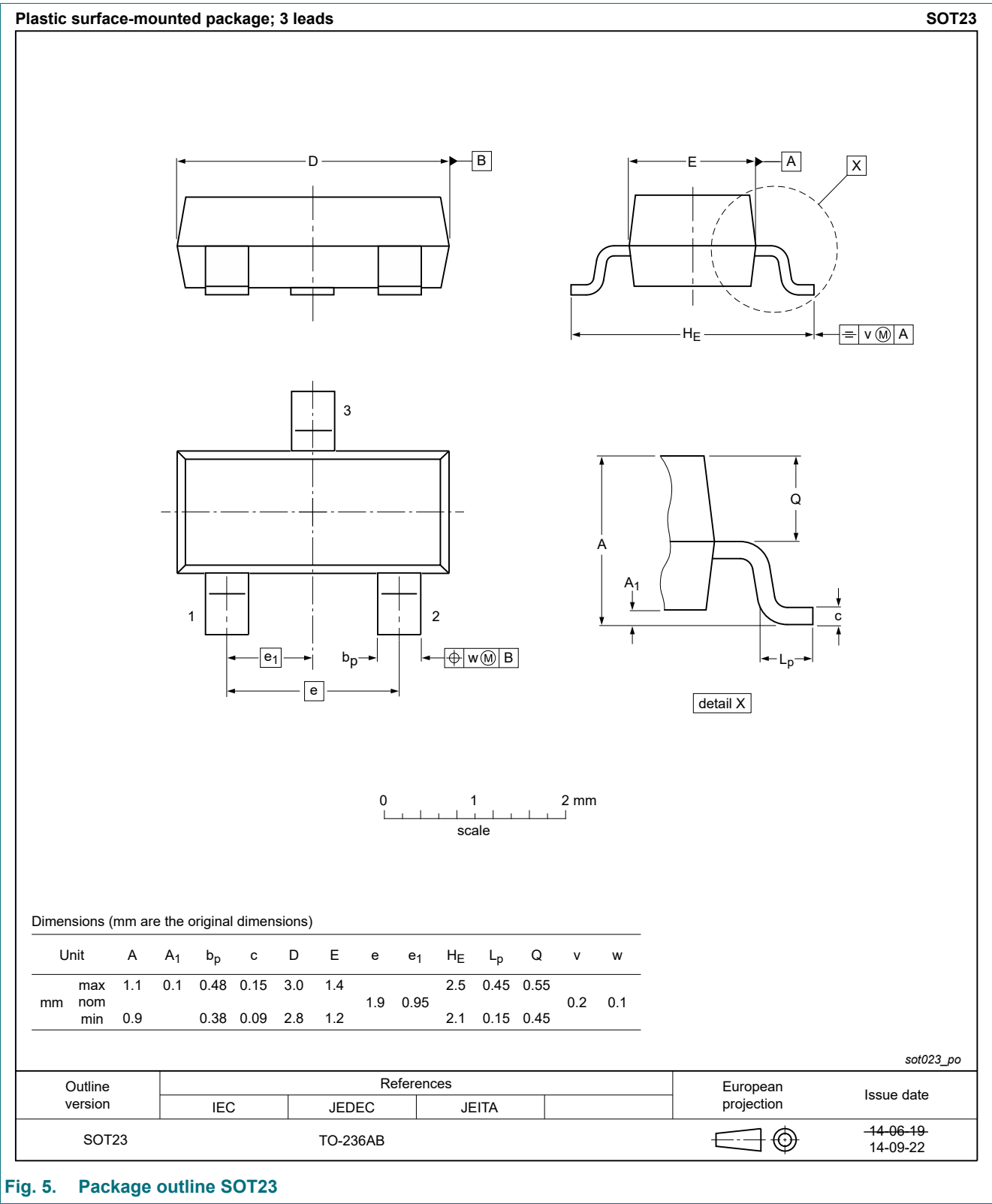
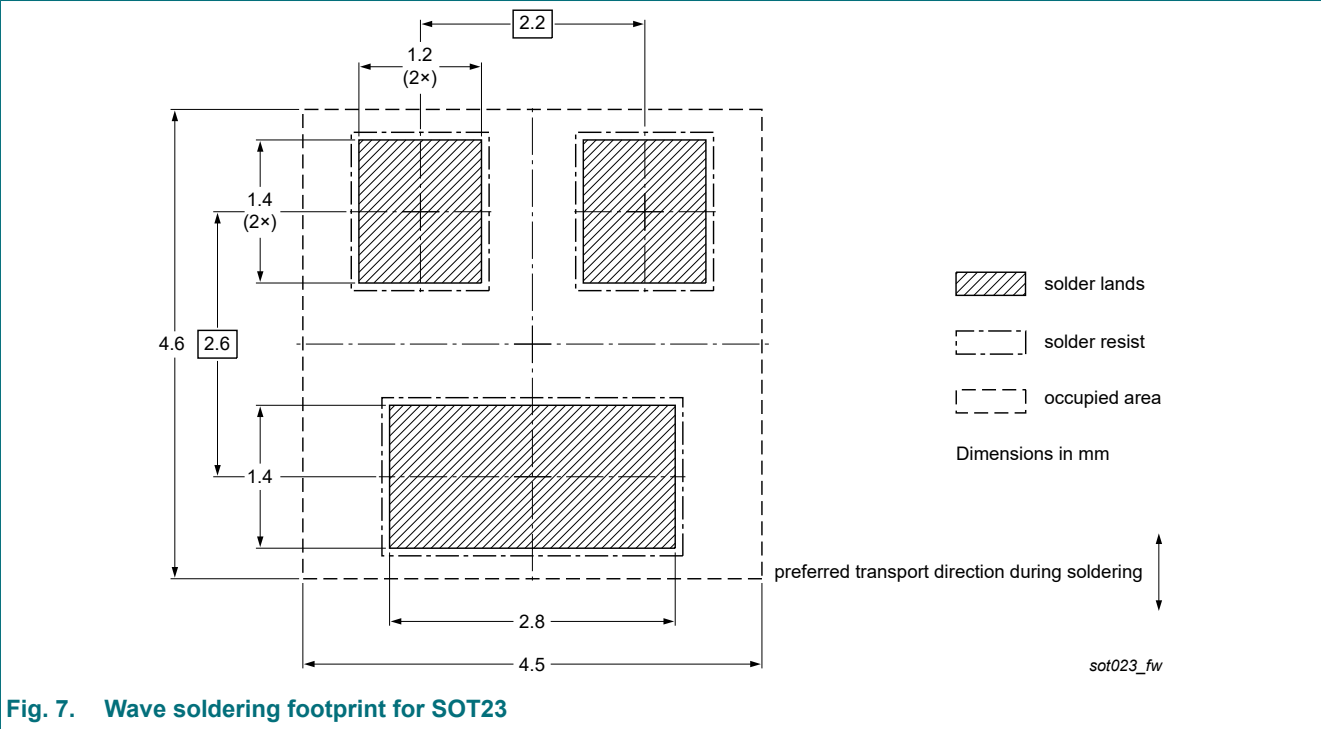
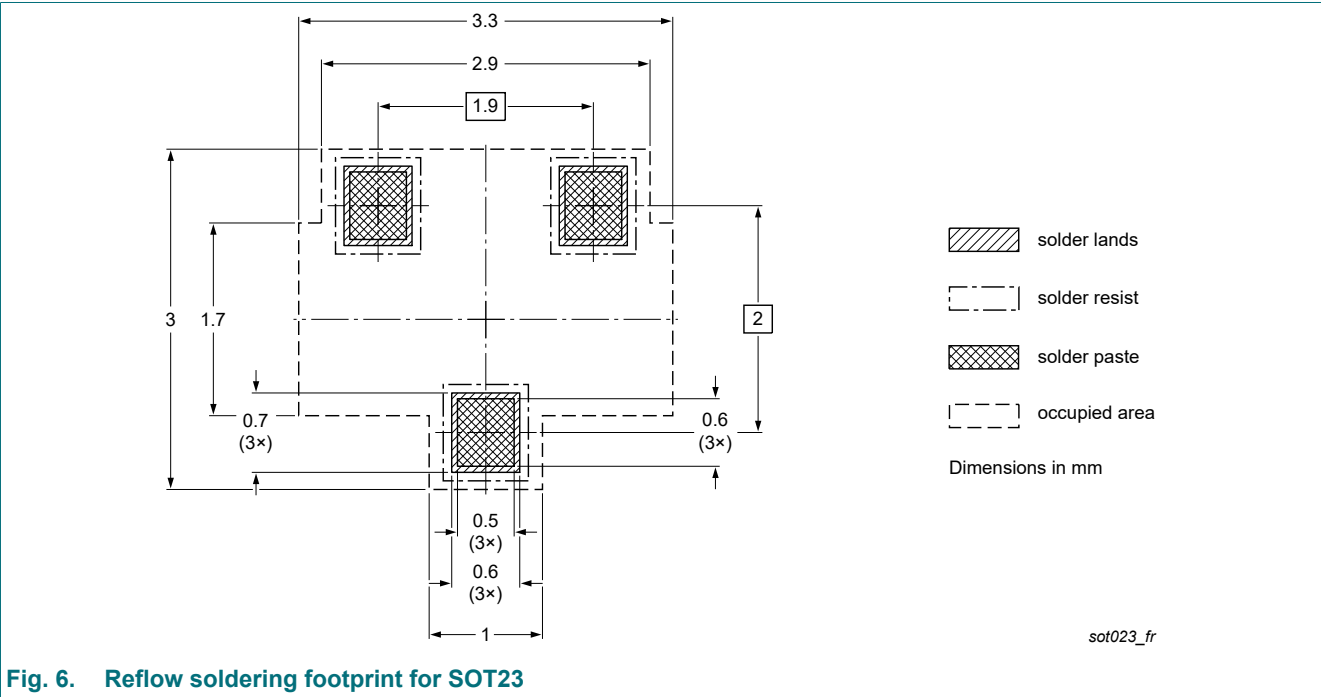


Fig. 5. Package outline SOT23

13. Soldering



## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAT54S v.6	20220701	Product data sheet	-	BAT54_SER v.5
Modifications:	<ul style="list-style-type: none"><li>Family data sheet reduced to single type data sheet.</li><li>Product changed to non-automotive qualification. Please refer to <a href="https://www.nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li><li>Packing information removed.</li></ul>			
BAT54_SER v.5	20121005	Product data sheet	-	BAT54_SERIES v.4
BAT54_SERIES v.4	20020304	Product data sheet	-	BAT54_SERIES v.3
BAT54_SERIES v.3	20011012	Product specification	-	BAT54 v.2
BAT54 v.2	19990506	Product specification	-	BAT54 v.1
BAT54 v.1	19960319	Product specification	-	-

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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